

**U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM**

SCIENTIFIC NAME: *Geranium kauaiense*

COMMON NAME: Nohoanu

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: August 2005

STATUS/ACTION:

☐ Species assessment - determined species did not meet the definition of endangered or threatened under the Act and, therefore, was not elevated to Candidate status

☐ New candidate

☒ Continuing candidate

☐ Non-petitioned

☒ Petitioned - Date petition received: May 11, 2004

☐ 90-day positive - FR date:

☒ 12-month warranted but precluded - FR date: May 11, 2005

☐ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:

a. Is listing warranted (if yes, see summary of threats below)? yes

b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? yes

c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, for the preceding 12 months, and continues to be, precluded by higher priority listing actions. During the past 12 months, most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken over the past 12 months, see the discussion of "Progress on Revising the Lists," in the current CNOR which can be viewed on our Internet website (<http://endangered.fws.gov>).

☒ Listing priority change

Former LP: 2

New LP: 5

Date when the species first became a Candidate (as currently defined): 1997

☐ Candidate removal: Former LP:

☐ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or

continuance of candidate status.

- ___ U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- ___ F – Range is no longer a U.S. territory.
- ___ I – Insufficient information exists on biological vulnerability and threats to support listing.
- ___ M – Taxon mistakenly included in past notice of review.
- ___ N – Taxon does not meet the Act’s definition of “species.”
- ___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Flowering plants, Geraniaceae (Geranium family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

CURRENT STATES/ COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Hawaii, island of Kauai

LAND OWNERSHIP: State-owned land.

LEAD REGION CONTACT: Paul Phifer, 503-872-2823, paul_phifer@fws.gov

LEAD FIELD OFFICE CONTACT: Pacific Islands Fish and Wildlife Office, Christa Russell, 808-792-9400, christa_russell@fws.gov

BIOLOGICAL INFORMATION:

Species Description *Geranium kauaiense* is a decumbent subshrub. Stems are reddish brown, often rooting at the nodes, growing embedded in moss mats or other bog plants, 5 to 10 decimeters (1.6 to 3.3 feet (ft)) long, with branches covered by persistent stipules and leafy only at the ends. Leaves are alternate, oblong to oblong cuneate, 1.1 to 2.9 centimeters (cm) (0.4 to 1.1 inches (in)) long, 0.4 to 0.8 cm (0.2 to 0.3 in) wide, with the upper surface glabrous, the lower surface densely silky strigose, and margins entire except four- to five-toothed at the apex. Flowers are usually three to four in terminal cymes that project beyond the leaves. Petals are white with purple veins, narrowly obovate, and 9 to 16 millimeters (mm) (0.4 to 0.6 in) long. Immature carpel bodies are 2 to 7 mm (0.08 to 0.3 in) long and densely pubescent. Seeds are unknown (Wagner *et al.* 1999a).

Taxonomy *Geranium kauaiense* was described by St. John. This species is recognized as a distinct taxon in Wagner *et al.* (1999a) and Wagner and Herbst (2003), the most recently accepted Hawaiian plant taxonomy.

Habitat Typical habitat is bog and bog margins at elevations between 1,220 and 1,250 meters (4,000 and 4,100 ft) (Wagner *et al.* 1999a; Hawaii Natural Heritage Program 2004).

Historical and Current Range/Current Status This species is known from three populations

totaling 100 to 200 individuals in the Alakai Swamp area of Kauai (Steve Perlman, National Tropical Botanical Garden, pers. comm. 1996; Marie Brueggemann, U.S. Fish and Wildlife Service (Service), pers. comm. 2004). Service and Hawaii Division of Forestry and Wildlife staff have monitored all three populations over the last eight years and the number of individuals has fluctuated very little due to the longevity of the individuals and vegetative reproduction, but no sexual regeneration has been observed (M. Brueggemann, pers. comm. 2005; Service Kauai bog monitoring database 2005).

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

Geranium kauaiense is threatened by feral pigs (*Sus scrofa*) that degrade and destroy habitat (S. Perlman, pers. comm. 1996). As early as 1778, European explorers introduced livestock, which became feral, increased in number and range, and caused significant changes to the natural environment of Hawaii. Past and present activities of introduced alien mammals are the primary factor altering and degrading vegetation and habitat on Kauai. Pigs are currently present on Kauai and four other islands, and inhabit rain forests and grasslands. While rooting in the ground in search of the invertebrates and plant material they eat, feral pigs disturb and destroy vegetative cover, trample plants and seedlings, and threaten forest regeneration by damaging seeds and seedlings. They disturb soil and cause erosion, especially on slopes. Alien plant seeds are dispersed on their hooves and coats as well as through their digestive tracts, and the disturbed soil is fertilized by their feces, helping these plants to establish. Pigs are a major vector in the spread of many introduced plant species (Cuddihy and Stone 1990; Wagner *et al.* 1999a). Pigs have been fenced out of the three bogs where *Geranium kauaiense* currently occurs; however, without continued monitoring and maintenance of those fences, pigs from surrounding areas can easily access fenced areas.

B. Overutilization for commercial, recreational, scientific, or educational purposes.

None known.

C. Disease or predation.

Predation of individual plants by pigs is highly probable if the fences are not maintained (S. Perlman, pers. comm. 1996).

D. The inadequacy of existing regulatory mechanisms.

The Forest Reserve Act of 1903 was an important action that protected watersheds in Hawaii. This act has been strengthened and re-titled Hawaii Department of Land and Natural Resources Title 13, Chapter 104 Rules Regulating Activities within Forest Reserves and provides protection to native forest values from certain degrading factors caused by human activities. The Hawaii Department of Land and Natural Resources Regulation (Administrative Rule No. 1, Chapter 3) established the 4,022 ha (9,939 ac) Alakai Wilderness Preserve in 1964, recognizing the pristine forest values of that area and the need to control potential degrading factors. No funding was obligated along with this law to allow Hawaii Department of Land and Natural Resources to adequately manage the area. Pigs are managed in Hawaii as a game animal, but many herds populate inaccessible areas where hunting has little effect on their numbers (Hawaii Heritage Program 1990). Pig hunting is allowed on all islands either year-round or during

certain months, depending on the area (Hawaii Department of Lands and Natural Resources n.d.-a, n.d.-b, n.d.-c, n.d.-d). Hunting is allowed within the Alakai Wilderness, but because of its remoteness and rugged topography, little public hunting is done in the areas where this species occurs. Pigs have been fenced out of the three bogs where *Geranium kauaiense* currently occurs; however, without continued monitoring and maintenance of those fences, pigs from surrounding areas can easily access fenced areas.

E. Other natural or manmade factors affecting its continued existence.

With only three known populations of *Geranium kauaiense* left, reduced reproductive vigor and extinction from randomly occurring events, such as hurricanes, are threats to this species. Alien plant species (discussed below) are also becoming a greater threat to this species at this time. The original native flora of Hawaii consisted of about 1,400 species, nearly 90 percent of which were endemic. Of the total native and naturalized Hawaiian flora of 1,817 taxa, 47 percent were introduced from other parts of the world, and nearly 100 species have become pests (Smith 1985; Wagner *et al.* 1999a). Several studies (Cuddihy and Stone 1990; Wood and Perlman 1997; Robichaux *et al.* 1998) indicate nonnative plant species may outcompete native plants similar to *Geranium kauaiense*. Competition may be for space, light, water, or nutrients, or there may be a chemical inhibition of other plants (Smith 1985; Cuddihy and Stone 1990). In addition, nonnative pest plants found in habitat similar to that of this species have been shown to make the habitat less suitable for native species (Smathers and Gardner 1978; Smith 1985; Loope and Medeiros 1992; Medeiros *et al.* 1992; Ellshoff *et al.* 1995; Meyer and Florence 1996; Medeiros *et al.* 1997; Loope *et al.* 2004). In particular, alien pest plant species modify habitat by modifying availability of light, altering soil-water regimes, modifying nutrient cycling, or altering fire characteristics of native plant communities (Smith 1985; Cuddihy and Stone 1990; Vitousek *et al.* 1987). Because of demonstrated habitat modification and resource competition by nonnative plant species in habitat similar to the bog habitat of *G. kauaiense*, the Service believes nonnative plant species are a threat to this species. These nonnative plants are being controlled within the three fenced bogs, but will probably never be completely eradicated from Kauai because new propagules are constantly being dispersed into the fenced area from surrounding, unmanaged lands (M. Brueggemann, pers. comm. 2005). Many widespread alien taxa cannot be completely eradicated from an island or the State, and therefore ongoing control in managed areas is necessary (Loope 1998, Smith 1985).

Juncus planifolius (no common name) is a perennial rush which has naturalized in moist, open, disturbed depressions on margins of forests and in bogs on Kauai, Oahu, Molokai, Maui, and Hawaii (Coffey 1999). *Juncus planifolius* is only found in disturbed areas, so the removal of feral pigs will most likely stem the spread of this species (Perlman and Wood 1995; S. Perlman, pers. comm. 1997).

Andropogon virginicus (broomsedge) is a perennial, tufted grass, which is naturalized on Kauai, Oahu, and Hawaii along roadsides and in disturbed dry to mesic forest and shrubland (O'Connor 1999; Clyde Imada and Bernice Pauahi Bishop Museum, pers. comm. 1997). The saturation of soil in the bogs creates a lack of oxygen similar to conditions found in dry or mesic habitat, which inhibits the uptake of water by plant roots, resulting in drought conditions (Joan Canfield, Service, pers. comm. 1996). Broomsedge is beginning to establish in the bogs of the Alakai that are most easily accessible to humans and may become a threat to *Geranium kauaiense* if

disturbance to the bogs continues (Perlman and Wood 1995; M. Bruegmann, pers. comm. 2005).

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

The Service, working in cooperation with the State of Hawaii, Division of Forestry and Wildlife, provided funding to fence the three bogs in which *Geranium kauaiense* currently occurs. Biannual monitoring, weed control, and fence maintenance have been conducted since 1996 by the Service and the State's Division of Forestry and Wildlife. Additional funding will be required for annual monitoring, fence maintenance, and weed control. The most recent complete monitoring for this species was conducted in 2005 (Service Kauai bog monitoring database 2005).

SUMMARY OF THREATS

The greatest threat to *Geranium kauaiense* at this time is the lack of sexual regeneration. Two other major threats to this species include feral pigs and nonnative plants, which are believed to be a major cause of the decline of this species throughout its range. Feral pigs have been fenced out of the three bogs where *G. kauaiense* currently occurs, but the fences must be continually maintained to prevent incursion. Nonnative plants have been greatly reduced in all three fenced bogs, and are not found in the immediate vicinity of any *G. kauaiense* individuals. This species is not reproducing, even though the major known threats have been controlled over the past nine years.

SUMMARY OF REASONS FOR ADDITION, REMOVAL OR LISTING PRIORITY CHANGE

The listing priority number is being changed from 2 to 5 because the three bog areas in which all individuals of this species are currently found are fenced, feral pigs have been removed, and nonnative plant control is being implemented within the fenced areas. Therefore, the threats of habitat degradation and destruction, and dispersal of nonnative plants from feral pigs, and competition with nonnative plants are non-imminent since they are not currently occurring. In order to prevent future incursion of the fenced areas by feral pigs, the fences must be continually surveyed and maintained. Should the integrity of the fences be compromised or control of nonnative plants cease, the LPN for *Geranium kauaiense* will be reevaluated.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5*
		Subspecies/population	6
Moderate	Imminent	Monotypic genus	7

to Low	Non-imminent	Species	8
		Subspecies/population	9
		Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:

This species is highly threatened by pigs that directly prey upon it, degrade and destroy habitat, and by nonnative plants that outcompete and displace it. Threats to montane bog habitat of *Geranium kauaiense* occur throughout its range, and are expected to continue or increase without control or eradication. Feral pigs have been fenced out of the three bogs where *G. kauaiense* currently occurs, but the fences must be continually maintained to prevent incursion. Nonnative plants have been greatly reduced in all three fenced bogs, and are not found in the immediate vicinity of any *G. kauaiense* individuals. This species is not reproducing, even though the major known threats have been controlled over the past nine years.

Imminence:

Threats to *Geranium kauaiense* from pigs and nonnative plants are non-imminent because the bogs in which all individuals of this species are currently found are fenced and nonnative plant control is underway within the fenced areas. However, in order to prevent future incursion of the fenced areas by feral pigs, the fences must be continually maintained. Should the integrity of the

fences be compromised or control of nonnative plants cease, the LPN for *G. kauaiense* will be reevaluated.

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No. The species does not appear to be appropriate for emergency listing at this time because the immediacy of the threats is not so great as to imperil a significant proportion of the taxon within the time frame of the routine listing process. In addition, the Service, working in cooperation with the State Division of Forestry and Wildlife, has fenced the three bogs in which the *Geranium kauaiense* occurs and conducts regular weed control efforts, which benefit this species. If it becomes apparent that the routine listing process is not sufficient to prevent large losses that may result in this species' extinction, then the emergency rule process for this species will be initiated. We will continue to monitor the status of *G. kauaiense* as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures.

DESCRIPTION OF MONITORING:

Much of the information in this form is based on the results of a meeting of 20 botanical experts held by the Center for Plant Conservation in December of 1995, and was updated with information from a survey of Kauai bogs by National Tropical Botanical Garden in 1995 and personal communication with Steve Perlman, National Tropical Botanical Garden, in 1996. We have incorporated additional information on this species from our files and the most recent supplement to the *Manual of the Flowering Plants of Hawaii* (Wagner and Herbst 2003). In 2004, the Pacific Islands office contacted the following species experts: Bob Hobdy, retired from Hawaii Division of Forestry and Wildlife; Joel Lau, Hawaii Natural Heritage Program; Art Medeiros, U.S.G.S. Biological Resources Discipline; Hank Oppenheimer, resource manager for Maui Land and Pineapple Company; and Steve Perlman and Ken Wood, National Tropical Botanical Garden. New information on status and management was provided by Marie Bruegmann of the Service in 2004. In 2005 we contacted the species experts listed below, but received no new information on this taxon except our monitoring data (Service Kauai bog monitoring database 2005).

The Hawaii Natural Heritage Program identified this species as critically imperiled (Hawaii Natural Heritage Program Database 2004). Based on the International Union for Conservation of Nature and Natural Resources Red Plant Data Book rarity categories, this species is recognized as Rare (could be considered at risk) by Wagner *et al.* (1999b).

This level of monitoring is appropriate to update the status of the species, since the populations are monitored in detail one to two times a year by the Service and the results are included in this assessment.

COORDINATION WITH STATES:

In October 2004 we provided the Hawaii Division of Forestry and Wildlife with copies of our most recent candidate assessments for their review and comment. Vickie Caraway, the State botanist, reviewed the information for this species and provided no additional information or

corrections (V. Caraway, pers. comm. 2005).

LITERATURE CITED and Other REFERENCES:

List all experts contacted:

Name	Date	Place of Employment
1. Joel Lau	June 28, 2005	Hawaii Natural Heritage Program
2. Art Medeiros	June 28, 2005	U.S.G.S. Biological Resources Discipline
3. Jim Jacobi	June 28, 2005	U.S.G.S. Biological Resources Discipline
4. Rick Warshauer	June 28, 2005	U.S.G.S. Biological Resources Discipline
5. Hank Oppenheimer	June 28, 2005	Maui Land and Pineapple Company
6. Kapua Kawelo	June 28, 2005	U.S. Army
7. Dave Lorence	June 28, 2005	National Tropical Botanical Garden
8. Steve Perlman	March 29, 2005	National Tropical Botanical Garden
9. Ken Wood	August 2, 2005	National Tropical Botanical Garden
10. Marie Brueggmann	July 13, 2005	U.S. Fish and Wildlife Service
11. Vickie Caraway	June 14, 2005	Hawaii Division of Forestry and Wildlife

List all databases searched:

Name	Date
1. Hawaii Natural Heritage Program	2004
2. U.S. Fish and Wildlife Service Kauai bog monitoring database	2005

Other resources utilized:

Center for Biological Diversity, Dr. Jane Goodall, Dr. E.O. Wilson, Dr. Paul Ehrlich, Dr. John Terborgh, Dr. Niles Eldridge, Dr. Thomas Eisner, Dr. Robert Hass, Barbara Kingsolver, Charles Bowden, Martin Sheen, the Xerces Society, and the Biodiversity Conservation Alliance. 2004. Hawaiian Plants: petitions to list as federally endangered species. May 4, 2004.

Coffey, J.C. 1999. Juncaceae: in Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the flowering plants of Hawai'i. University of Hawaii Press and Bishop Museum Press, Honolulu. Bishop Mus. Spec. Publ. 83: 1451-1455.

Cuddihy, L.W., and C.P. Stone. 1990. Alteration of native Hawaiian vegetation; effects of humans, their activities and introductions. Coop. Natl. Park Resources Stud. Unit, Hawaii. 138 pp.

Ellshoff, Z.E., D.E. Gardner, C. Wikler, and C.W. Smith. 1995. Annotated bibliography of the genus *Psidium*, with emphasis on *P. cattleianum* (strawberry guava) and *P. guajava* (common guava), forest weeds in Hawai'i. Cooperative National Park Resources Studies Unit, University of Hawaii. Technical Report 95.

Hawaii, Department of Land and Natural Resources. N.d.-a. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Oahu. Division of Forestry and Wildlife, Honolulu. 2 pp.

Hawaii, Department of Land and Natural Resources. N.d.-b. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Molokai. Division of Forestry and Wildlife, Honolulu. 2 pp.

Hawaii, Department of Land and Natural Resources. N.d.-c. Summary of Title 13, Chapter 123, Game mammal hunting rules, island of Maui. Division of Forestry and Wildlife,

- Honolulu. 2 pp.
- Loope, L.L. and A.C. Medeiros. 1992. A new and invasive grass on Maui. Newsletter of the Hawaiian Botanical Society 31: 7-8.
- Loope, L.L. 1998. Hawaii and Pacific Islands. Pp. 747-774. In: M.J. Mac, P.A. Opler, C.E. Puckett Haecker, and P.D. Doran (eds.). Status and Trends of the Nation's Biological Resources, Volume 2. U.S. Department of the Interior, U.S. Geological Survey, Reston, VA.
- Loope, L., F. Starr and K. Starr. 2004. Management and research for protecting endangered Hawaiian plant species from displacement by invasive plants on Maui, Hawaii. Weed Technology 18: 1472-1474.
- Medeiros, A.C., L.L. Loope, P. Conant and S. McElvaney. 1997. Status, ecology, and management of the invasive plant, *Miconia calvenscens* DC (Melastomataceae) in the Hawaiian Islands. Bishop Mus. Occas. Pap. 48: 23-36.
- Medeiros, A.C., L.L. Loope, T. Flynn, S.J. Anderson, L.W. Cuddihy, and K.A. Wilson. 1992. Notes on the status of an invasive Australian tree fern (*Cyathea cooperi*) in Hawaiian rain forests. American Fern Journal 82: 27-33.
- Medeiros, A.C., Jr., L.L. Loope, and R.A. Holt. 1986. Status of native flowering plant species on the south slope of Haleakala, East Maui, Hawaii. Coop. Natl. Park Resources Stud. Unit, Hawaii, Techn. Rept. 59: 1-230.
- O'Connor, P.J. 1999. Poaceae: in Wagner, W.L., D.R. Herbst, and S.H. Sohmer, Manual of the flowering plants of Hawai'i. University of Hawaii Press and Bishop Museum Press, Honolulu. Bishop Mus. Spec. Publ. 83: 1481-1604.
- Perlman, S. and K. Wood. 1995. Kauai Bog Survey Report. Prepared for the U.S. Fish and Wildlife Service, Honolulu, HI.
- Robichaux, R., J. Canfield, F. R. Warshauer, L. Perry, M. Bruegmann, and G. Carr. 1998. Adaptive Radiation. Endangered Species Bulletin. November/December.
- Scott, J.M., S. Mountainspring, F.L. Ramsey, and C.B. Kepler. 1986. Forest bird communities of the Hawaiian Islands: Their dynamics, ecology, and conservation. Studies in Avian Biology 9: 1-429. Cooper Ornithological Society, Los Angeles.
- Smather, G.A. and D.E. Gardner. 1978. Stand analysis of an invading firetree (*Myrica faya* Aiton) population, Hawai'i. Proceeding of the Second Conference on Natural Science, Hawaii Volcanoes National Park, pp. 274-288.
- Smith, C.W. 1985. Impact of alien plants on Hawai'i's native biota: in Stone, C.P., and J.M. Scott (eds.), Hawai'i's Terrestrial Ecosystems: Preservation and Management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 180-250.
- Stone, C.P. 1985. Alien animals in Hawai'i's native ecosystems: toward controlling the adverse effects of introduced vertebrates: in Stone, C.P., and J.M. Scott (eds.), Hawai'i's Terrestrial Ecosystems: Preservation and Management. Coop. Natl. Park Resources Stud. Unit, Univ. Hawaii, Honolulu, pp. 251-297.
- Tomich, P.Q. 1986. Mammals in Hawai'i: A synopsis and notational bibliography. Bishop Museum Press, Honolulu. 375 pp.
- Vitousek, P.M., C.M. D'Antonio, L.L. Loope, M. Rejnaneck, and R. Westerbrooks. 1997. Introduced species: a significant component of human-caused global change. New Zealand Journal of Ecology 21(1): 1-16.
- Wagner, W.L., D.R. Herbst, and S.H. Sohmer. 1999a. Manual of the Flowering Plants of Hawai'i, Bishop Mus. Spec. Publ. 97: 1-1918. University of Hawaii Press and Bishop

- Museum Press, Honolulu.
- Wagner, W.L., M.M. Brueggmann, and J.Q.C. Lau. 1999b. Hawaiian vascular plants at risk: 1999. Bishop Mus. Occas. Pap. 60: 1-58.
- Wagner, W.L. and D.R. Herbst. 2003. Electronic supplement to the manual of flowering plants of Hawai'i, version 3.1. December 12, 2003. Available from the Internet. URL: <http://rathbun.si.edu/botany/pacificislandbiodiversity/hawaiianflora/supplement.htm>.
- Wood, K.R. and S. Perlman. 1997. Maui 14 plant survey final report. Submitted by National Tropical Botanical Garden, October, 1997.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes to the candidate list, including listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all 12-month petition findings, additions of species to the candidate list, removal of candidate species, and listing priority changes.

Approve: **Acting** David W. Winkler 11/10/05
Regional Director, Fish and Wildlife Service Date

Marshall P. Jones

Concur: _____ August 23, 2006
Director, Fish and Wildlife Service Date

Do not concur: _____
Director, Fish and Wildlife Service Date

Date of annual review: October 4, 2005
Conducted by: Marie M. Brueggmann, Pacific Islands FWO
Plant Recovery Coordinator

Comments:
PIFWO Review

Reviewed by: Christa Russell Date: September 22, 2005
Plant Conservation Program Leader

Gina Shultz Date: October 12, 2005
Assistant Field Supervisor,
Endangered Species

Patrick Leonard Date: October 12, 2005
Field Supervisor